**IN THE CLAIMS:**

Claim 1 (Currently Amended): A manufacturing method for a single crystal of calcium fluoride, having its optical properties improved through an annealing process comprising the steps of:

providing a single crystal of calcium fluoride in a sealable container, sealing said **sealable** container, then

heating said **sealable** container with a heater arranged external to said container such that a temperature inside said **sealable** container is raised to a first temperature, which is lower than a melting point of said single crystal of calcium fluoride,

maintaining the temperature inside said **sealable** container at said first temperature for a designated period of time, **and**

lowering the temperature inside said **sealable** container to ~~room~~ **a second** temperature **at a first rate, and lowering the temperature inside said sealable container from the second temperature at a second rate**, wherein ~~the step of lowering the temperature comprises:~~

~~decreasing the temperature inside said container to a second temperature, which is in the range of around 600 °C to 900 °C at a rate of 2 °C/hour or less, and then~~

~~decreasing the temperature inside said container from said second temperature to room temperature,~~

~~wherein~~ **said first rate is 2°C/hour or less, said second rate is 3°C/hour or less, the first rate is lower than the second rate,** the first temperature is between 1020 °C to 1150°C**, and the second temperature is between 600°C to 900°C**.

Claims 2-4 (Cancelled).

Claim 5 (Previously Presented): A manufacturing method according to claim 1, wherein a single crystal of calcium fluoride with a diameter of ∅ 200 mm or greater, which can be used in an optical system for photolithography, is obtained.

Claim 6 (Previously Presented): A manufacturing method according to claim 5, wherein a single crystal of calcium fluoride with a difference in the refractive index, $\Delta n$, equal to $2 \times 10^{-6}$ or less is obtained.

Claim 7 (Previously Presented): A manufacturing method according to claim 5, wherein a single crystal of calcium fluoride with a double refraction value, in a direction of the axis of light, of 2 nm/cm, or less is obtained.

Claim 8 (Previously Presented): A manufacturing method according to claim 5, wherein a single crystal of calcium fluoride with a double refraction value, in an off-axis direction perpendicular to the axis of light, of 5 nm/cm or less is obtained.

Claim 9 (Currently Amended): A manufacturing method ~~for a single crystal of calcium fluoride having its optical properties improved~~ **according to claim 1, further** comprising the steps of:

providing a single crystal of calcium fluoride and a fluorination agent in ~~a second~~

**an additional** container arranged in ~~a~~ **said** sealable ~~first~~ container, sealing said ~~first~~ **sealable** container, then

heating said ~~first~~ **sealable** container with a heater arranged external to said ~~first~~ **sealable** container such that a temperature inside said ~~second~~ **additional** container is raised to ~~a~~ **the** first temperature, which is lower than a melting point of said single crystal of calcium fluoride, while said ~~second~~ **additional** container is filled with a fluorine gas atmosphere,

maintaining the temperature inside said ~~second~~ **additional** container at the first temperature for a designated period of time,

lowering the temperature inside said ~~first~~ **sealable** container and the temperature inside said ~~second~~ **additional** container to ~~room~~ **the second** temperature, ~~wherein the step of lowering the temperature comprises:~~

~~decreasing the temperature inside said first container and the temperature inside said second container to a second temperature, which is in the range of around 600 °C to °900 C, at a rate of 2 °C/hour or less, and then~~

~~decreasing the temperature inside said first container and the temperature inside said second container to room temperature,~~ **and**

opening the inside of said first container to a normal atmosphere

~~wherein,~~

~~the first temperature is between 1020 °C and 1150 °C.~~

Claims 10-25 (Cancelled).

Claim 26 (Currently Amended): A manufacturing method ~~for a single crystal of calcium fluoride, having its optical properties improved comprising the steps of:~~

~~providing a single crystal of calcium fluoride in a sealable container, sealing said container, then~~

~~heating said container with a heater arranged external to said container such that a temperature inside said container is raised to a first temperature, which is lower than a melting point of said single crystal of calcium fluoride,~~

~~maintaining the temperature inside said container at the first temperature for a designated period of time,~~

~~lowering the temperature inside said container to room temperature~~ **according to claim 1**, wherein~~,~~

~~the first temperature, which is between 1020 °C and 1150 °C, is lowered to a second temperature, which is in the range of around 600 °C to 900 °C, at a rate of~~ **said first rate is** 1.2 °C/hour or less.

Claim 27 (Currently Amended): A manufacturing method according to claim ~~26~~ **1**, wherein the step of lowering the temperature comprises decreasing the temperature from said second temperature to a third temperature, which is in the range of around 400 °C to 600 °C, at ~~a rate of 3~~ **said second rate, and decreasing the temperature from the third temperature at a third rate, which is 5**°C/hour or less.

Claims 28-32 (Cancelled).

Claim 33 (Currently Amended): A manufacturing method ~~for a single crystal of calcium fluoride having its optical properties improved comprising the steps of:~~ **according to claim 9**

~~providing a single crystal of calcium fluoride and a fluorination agent in a second container arranged in a sealable first container, sealing said first container, then~~

~~heating said first container with a heater arranged external to said first container such that a temperature inside said second container is raised to a first temperature, which is lower than a melting point of said single crystal of calcium fluoride, while said second container is filled with a fluorine gas atmosphere,~~

~~maintaining the temperature inside said second container at said first temperature for a designated period of time,~~

~~lowering the temperature inside second container to room temperature,~~

~~opening the inside of said first container to a normal atmosphere,~~

wherein,

~~the first temperature is between 1020 °C and 1150 °C, and~~

~~the temperature is decreased from said first temperature to a second temperature, which is in the range of around 600 to 900 °C, at a rate of~~ **said first rate is** 1.2 °C/hour or less.

Claim 34 (Currently Amended): A manufacturing method according to claim ~~33~~**9**, wherein the step of lowering the temperature comprises decreasing the temperature from said second temperature to a third temperature, which is in the range of around 400 to 600 °C, at ~~a rate of 3 °C/hour or less~~ **said second rate, and decreasing the temperature from the third temperature at a third rate, which is 5°C/hour or less**.

Claim 35 (Cancelled).

Claim 36 (Currently Amended): A manufacturing method according to claim ~~33~~9, wherein a single crystal of calcium fluoride with a diameter of ⌀ 230 mm or greater, which can be used for the optical system for photolithography, is obtained.

Claim 37 (Currently Amended): A manufacturing method according to claim ~~36~~9, wherein a single crystal of calcium fluoride with a difference in the refractive index, $\Delta n$, equal to $2 \times 10^{-6}$ or less is obtained.

Claim 38 (Currently Amended): A manufacturing method according to Claim ~~36~~9, wherein a single crystal of calcium fluoride with a double refraction value, in a direction of the axis of light, of 2 nm/cm or less is obtained.

Claim 39 (Currently Amended): A manufacturing method according to claim ~~36~~9, wherein a single crystal of calcium fluoride with a double refraction value, in the off-axis direction perpendicular to the axis of light, of 5 nm/cm or less is obtained.

Claims 40-42 (Cancelled).